

1 **HUMANITY INTERFACE DEVELOPMENT SYSTEM OF TESTING**
2 **PROGRAM OF CIRCUIT BOARD**

3 **BACKGROUND OF THE INVENTION**

4 **1. Field of the Invention**

5 The present invention relates to a humanity interface development
6 system of a testing program of a circuit board, and more particularly to a
7 humanity interface development system of a testing program of a circuit
8 board

9 **2. Description of the Related Art**

10 A conventional testing program for testing the circuit board needs a
11 designer who is trained professionally to design the program. Thus, when
12 circuit boards having different requirements need to be tested, persons having
13 the professional technology or background are needed for amendment or
14 maintenance of the program, thereby causing inconvenience to the operator.

15 **SUMMARY OF THE INVENTION**

16 The primary objective of the present invention is to provide a
17 humanity interface development system of a testing program of a circuit
18 board, essentially including: building configuration of objects to be tested,
19 defining footing of objects to be tested, using a program generator, building
20 data of the testing chapters, building documents and figure files of objects to
21 be tested, building reference data, building intercepted data of coordinates of
22 positions of the parts, building relationships of items to failure rates of parts,
23 and linking and compiling files, thereby forming a humanity interface, to
24 build a data base required by the testing programs simultaneously, for testing

1 the same circuit board in a large amount manner, thereby efficiently
2 achieving the purpose of convenience and utility.

3 In accordance with the present invention, there is provided a
4 humanity interface development system of a testing program of a circuit
5 board, comprising: a main menu by which an operator may select one of
6 multiple items with data pre-built therein, the main menu including the
7 following items: building configuration of objects to be tested, defining
8 footing of objects to be tested, using a program generator, building data of
9 testing chapters, building documents and figure files of objects to be tested,
10 building reference data, building intercepted data of coordinates of positions
11 of parts, building the relationships of items to failure rates of parts, and
12 linking and compiling files, building of data of each object to be tested co-
13 operating with the program generator to produce the required program, and
14 the items of building data of testing chapters and linking and compiling files
15 co-operating with steps of building of data of each object to be tested, so that
16 the operator may use data base and programs that are built according to
17 existing orders of the system for testing a circuit board.

18 Further benefits and advantages of the present invention will
19 become apparent after a careful reading of the detailed description with
20 appropriate reference to the accompanying drawings.

21 **BRIEF DESCRIPTION OF THE DRAWINGS**

22 Fig. 1 is a flow chart of a humanity interface development system of
23 a testing program of a circuit board in accordance with the present invention;

Fig. 2 is a flow chart of an item of building configuration of the objects to be tested of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 3 is a flow chart of an item of defining footing of objects to be tested "B" of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 4 is a flow chart of an item of using a program generator "C" of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 5 is a flow chart of an item of selecting the testing flow chart of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 6 is a flow chart of a procedure of setting power supply of the system of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 7 is a flow chart of a starting procedure of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 8 is a flow chart of a procedure of setting the exciting signal of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 9 is a flow chart of a procedure of setting a measuring signal of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 10 is a flow chart of a procedure of closing the exciting signal of the humanity interface development system of a testing program of a circuit board in accordance with the present invention;

Fig. 11 is a flow chart of the process of file maintenance or reproduction of the humanity interface development system of a testing program of a circuit board in accordance with the present invention; and

Fig. 12 is a flow chart of an item of building intercepted data of coordinates of positions of parts of the humanity interface development system of a testing program of a circuit board in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and initially to Fig. 1, a humanity interface development system of a testing program of a circuit board in accordance with a preferred embodiment of the present invention comprises a main menu 1 by which the operator may select one of multiple items with data pre-built therein.

The main menu 1 essentially contains nine primary items, including the following procedures: building configuration of objects (such as a circuit board) to be tested "A", defining footing of objects to be tested "B", using a program generator "C", building data of testing chapters "D", building documents and figure files of objects to be tested "E", building reference data "F", building intercepted data of coordinates of positions of parts "G", building relationships of items to failure rates of parts "H", and linking and compiling files "I".

1 The building of data of each object to be tested may co-operate with
2 the program generator "C" to produce the required program, and the items of
3 building data of testing chapters "D" and linking and compiling files "I" may
4 co-operate with the steps of building of data of each object to be tested, so
5 that the operator may conveniently use the data base and the programs that
6 are built according to the existing orders of the system for testing the circuit
7 board.

8 It is to be noted that, the steps of building of data of each object to
9 be tested includes the following procedures: building configuration of objects
10 to be tested "A", defining footing of objects to be tested "B", building
11 documents and figure files of objects to be tested "E", building relationships
12 of items to failure rates of parts "H", building reference data "F", and
13 building intercepted data of coordinates of positions of parts "G".

14 Referring to Fig. 2, the item of building configuration of the objects
15 to be tested "A" includes the following steps:

16 Selecting the name of the object to be tested 10: displaying the
17 name of the object to be selected from the existing data base of the display,
18 choosing and identifying the name of the object;

19 Displaying the data of the object to be tested 11: displaying the
20 original chosen records in the data base to facilitate judgement of the
21 following addition and amendment; and

22 Selecting the processed items 12: selecting the items of addition,
23 deletion, amendment or returning to the previous page, wherein if the item of
24 addition is chosen, the operator needs to input the data of the new board

object to be tested 13, then store the data 14, and then return to the step of selecting the name of the object to be tested 10; if the item of deletion is chosen, the data of the object to be tested is deleted directly 15; if the item of amendment is chosen, the data of the object to be tested is amended 16, and is stored 17; if the item of returning to the previous page is chosen, the operator may return to the picture of the main menu 18.

Thus, the contents of each basic configuration of the objects to be tested may be built.

Referring to Fig. 3, the item of defining footing of objects to be tested "B" includes the following steps:

Displaying the picture of the name of the selected object to be tested 20: displaying the picture of the name and related illustration of the selected object to be tested, to facilitate direct reference of the operator;

If it is a new object to be tested 21: judging if it is a new object to be tested, if it is a new object to be tested, the operator may proceed the following settings, including:

Selecting a clamping tool 22: selecting an existing common clamping tool or making a new clamping tool;

Destining a new number 23: defining a new number to the new board to facilitate identification; and

Inputting footing data 24: inputting data of each footing manually;

If it is not a new object to be tested, it means that the object to be tested is an electronic board that has generated the testing program, so that

1 the data base of the system may directly display the record 25 for
2 identification of the operator;

3 Selecting a processing manner 26: the operator may select printing,
4 that is, the operator may select the printing item 260 to print the data of each
5 chosen item 261 for reference; if the operator selects ending, he needs to
6 select the clamping tool 27, that is, he has to select an existing common
7 clamping tool or make a new clamping tool; if the operator selects the
8 existing common clamping tool, the original footing data in the system may
9 be processed directly, to reproduce the cleared file of the footing to the
10 respective data menu 28, and the procedure is then ended 29; if the operator
11 selects to make a new clamping tool, the procedure is directly ended 29.

12 Referring to Fig. 4, the item of using the program generator "C"
13 includes the following steps:

14 Displaying the name of the object to be tested 30: displaying the
15 name the object to be tested and the related data for identification of the
16 designer;

17 Confirming 31: if the operator confirms the object to be tested, the
18 following procedure may be performed; if the operator does not confirm the
19 object to be tested, the picture returns to the main menu 310;

20 Selecting the program manner 32: the operator may respectively
21 select the modes of the program parameter, including testing, debug or limit;
22 if the operator selects the testing mode, he may input the testing parameter
23 33, if the operator selects the debug mode, he may input the debug parameter
24 34, after the two items 33 and 34 are input, the system respectively enters the

1 designs of test program or debug program, and the picture may indicate the
2 flow chart button 35 to prepare to proceed the step of selecting the testing
3 flow chart “J” as shown in Fig. 5; if the operator selects the limit mode, the
4 picture indicates selecting the item of the chapter or section to be amended
5 36, and selecting a testing manner 37 to select a testing manner such as the
6 function test or debug test, and after selection to perform the step of selecting
7 a testing number 370 or selecting a testing number and debugging 371, then
8 filling the limit value 372 for each program or step, then selecting confirming
9 the above steps and actions 373, if the above steps and actions are not
10 confirmed, the picture returns to the main menu 374, if the above steps and
11 actions are confirmed, the data in the data base may be changed, and the
12 picture returns to the step of displaying the name of the object to be tested 30;

13 Referring to Fig. 5, the item of selecting the testing flow chart “J”
14 includes the following steps: file maintenance or reproduction “K”, and
15 selecting the button of the testing flow chart 40.

16 The item of selecting the item of the testing flow chart 40 may be
17 changed and designed according to different testing processes and manners,
18 and the following is the most complete process recently. The designer may
19 change the following processes according to different requirements.

20 The process of selecting the item of the testing flow chart 40
21 includes the following steps: setting power supply of the system 41, starting
22 42, a first pause 43, setting the exciting signal 44, a second pause 45, setting a
23 measuring signal 46, a third pause 47, closing the exciting signal 48, a fourth

1 pause 49, updating codes of the testing program 50, and updating codes of the
2 debug program 51.

3 Referring to Fig. 6, the procedure of setting power supply of the
4 system 41 includes the following steps:

5 Setting the flow chart of power supply 410: inputting the values of
6 voltage and current 411, then selecting the picture of the next output mode,
7 such as outputting SSCheck Box 412, then selecting confirming 413, if the
8 above actions are confirmed, checking if the mode of the footing satisfies the
9 standard mode of the footing, such as the mode of Form C Relay 414, then
10 checking if the preset power supply of the footing is correct 415, if not,
11 amending the footing definition 416 and returning to the step of setting the
12 flow chart of power supply 410 to repeat the work; if the preset power supply
13 of the footing is correct, storing the above data 417, and then returning to the
14 picture of selecting the testing flow chart 418.

15 Referring to Fig. 7, the starting procedure 42 includes the following
16 steps:

17 Starting the flow chart 420: the system (such as the computer)
18 directly judging the parameter 421 to directly enter the testing step 4210 or
19 the debugging step 4211, then inputting the content number 422, then judging
20 if it is a new step or an old step 423, to respectively enter the step of
21 definition of a new step 4230 or download of an old step 4231, then judging
22 if the parameter and the step are reproduced to the next chapter or section
23 424, if so, changing the parameter 425, then selecting confirming 426, if the
24 above action is confirmed, storing the new parameter 427, if the above action

1 is not confirmed, returning to the picture of selecting the testing flow chart
2 428.

3 Referring to Fig. 5, the processes of the first pause 43, the second
4 pause 45, the third pause 47, and the fourth pause 49 respectively include the
5 steps: filling a hint message 430, 450, 470 and 490, and storing the hint
6 message 431, 451, 471 and 491.

7 Referring to Fig. 8, the procedure of setting the exciting signal 44
8 includes the flow chart of setting the exciting signal 440 which includes the
9 following steps: selecting the exciting signal 441, then inputting the values
10 and conditions 442, then selecting confirmation 443, if the values and
11 conditions are confirmed, storing the values and the conditions 444, if the
12 values and the conditions are not confirmed, returning to the picture of
13 selecting the testing flow chart 445.

14 Referring to Fig. 9, the procedure of setting a measuring signal 46
15 includes the flow chart of setting the measuring signal 460 which includes the
16 following steps: directly selecting the measuring signal 461, then confirming
17 if other instrument (such as a wave indicator) is used 462, when confirming
18 other instrument is used, displaying the picture of the instrument 463 and
19 inputting the values and conditions 464, when confirming no other
20 instrument is used, directly inputting the values and conditions 464, then
21 selecting confirmation 465, if the values and conditions are confirmed,
22 storing the values and conditions 466, if the values and conditions are not
23 confirmed, returning to the picture of selecting the testing flow chart 467.

Referring to Fig. 10, the procedure of closing the exciting signal 48 includes the flow chart of closing the exciting signal 480 which includes the following steps: selecting the exciting signal to be closed 481, then selecting confirmation 482, if the selection is confirmed, storing the changed results 483, if the selection is not confirmed, returning to the picture of selecting the testing flow chart 484.

Referring again to Fig. 5, the procedures of updating codes of the testing program 50, and updating codes of the debug program 51 include the following steps: judging if the column is blank 52, if the column is blank, directly displaying the hint 53, if the column is not blank, performing the action of capturing the program codes 54.

Referring to Fig. 11, the process of file maintenance or reproduction "K" includes the following steps:

Selecting file maintenance or reproduction 60: selecting the process of file maintenance or reproduction, if the process of file maintenance is selected, it is necessary to select the manner of file maintenance 61, if the process of reproduction is selected, it is necessary to select the manner of reproduction 62; wherein,

If the operator selects the manner of file maintenance 61, it includes the following steps:

selecting the class of the program code 63: selecting the testing parameter 630 or the debugging parameter 631, then returning to the picture of selecting the testing flow chart 632, to respectively perform the design of the testing program or the debugging program;

1 selecting amending the program code 64: selecting the content of
2 amendment 640 for testing or debugging, so as to select the number of the
3 primary and secondary testing or debugging step, i.e., to make sure the
4 content of the program, and selecting the manner of amendment 641 for
5 different program code, so as to select the working process such as deletion,
6 insertion or cancel, then selecting confirmation 642, if selecting the cancel
7 process, then directly returning to the picture of selecting the testing flow
8 chart 632, if selecting the working process of deletion or insertion, then
9 amending the content of the data base 644, and then returning to the
10 procedure of selecting amending the program code 64;

11 selecting returning to the picture of the program generator 65 or
12 returning to the picture of the main menu 66, then returning to the destined
13 position, to facilitate the following operator;

14 If the operator selects the manner of reproduction 62, it includes the
15 steps of selecting three modes of reproduction, including: the testing
16 programs being reproduced mutually 620, the testing programs being
17 reproduced to the debugging programs 621, and the debugging programs
18 being reproduced mutually 622; after selection, filling the reproduced content
19 623, then selecting confirmation 624, if not confirmed, then returning to the
20 picture of selecting the testing flow chart 625, if confirmed, then copying the
21 reproduced content 626 and returning to the picture of filling the reproduced
22 content 623 to repeat the above-mentioned work until the work is finished.

23 Referring to Fig. 1, the item of building data of testing chapters "D"
24 includes the following steps: selecting the object to be tested 700; then

1 displaying the testing contents 701 to indicate the number and name of the
2 testing contents of each chapter or section, and then inputting a representative
3 code 702 into the content of the picture to facilitate classification.

4 Referring to Fig. 1, the item of building documents and figure files
5 of objects to be tested “E” includes the following steps: preparing the hint of
6 documents and figure files 710, so that when the designer selects the item of
7 building documents and figure files of objects to be tested “E”, the picture
8 may display the related hints immediately, to remind the designer of
9 preparing the related documents and figure files for requirement of inputting,
10 and then the designer may make sure building the documents and figure files
11 of objects to be tested 711.

12 Referring to Fig. 1, the item of building reference data “F” includes
13 the following steps: selecting the new board or the old board 720, if selecting
14 the new board, then building data of the practical figures and images and data
15 of the positions of the parts 721 according to the instruction, so as to input the
16 figure file data of the files of the practical figures and images and the files of
17 the positions of the parts, and placing them in the destined menu, if selecting
18 the old board, then directly selecting the data on the figure files 722 by the
19 cursor, and then displaying the image 723 to display the picture of the related
20 figure files for confirmation of the designer.

21 Referring to Fig. 12, the item of building intercepted data of
22 coordinates of positions of parts “G” includes the following steps:

1 Selecting the object to be tested 80: selecting the corresponding
2 object to be tested, or selecting the item of returning to the main menu 800 to
3 return to the destined location;

4 Selecting inspection or building 81: after selecting the object to be
5 tested, then selecting the item of selecting inspecting the circuit board or
6 building the data base, if selecting the item of inspecting the circuit board,
7 then selecting controlling the picture 82 to directly amplify the inspection
8 picture, if selecting the item of building the data base, then selecting building
9 the related coordinate 83;

10 Selecting controlling the picture 82: selecting locally amplifying the
11 picture by the mouse 820 or amplifying the sub-picture 821; if selecting
12 locally amplifying the picture by the mouse 820, then moving the mouse to
13 directly inspect the picture, if selecting amplifying the sub-picture 821, then
14 forming a small-sized amplifying picture in the original picture;

15 Selecting building the related coordinate 83: selecting the mode of
16 building the related coordinate for the reference point or member;

17 Selecting building the coordinate of the reference point 84: directly
18 moving the cursor to select the position of the part, thereby forming a region
19 that may produce the related coordinates, and then selecting confirmation
20 840;

21 Selecting building the coordinate of the member 85: building the
22 coordinate of the member, such as the electronic part of the circuit board to
23 be tested, including the following steps:

1 Selecting the processing manner 86: selecting the processing
2 manner of amendment or addition;

3 Amendment 87: directly selecting amendment of the picture of the
4 part 870, and then selecting confirmation 871;

5 Addition 88: selecting the part 880, then selecting confirmation
6 881, then inputting the representative code 882, and then selecting
7 confirmation 883.

8 Thus, the procedure of building intercepted data of coordinates of
9 positions of parts "G" may be accomplished conveniently, so that each of the
10 parts of the circuit board may correspond to the data base of the system.

11 Referring to Fig. 1, the item of building relationships of items to
12 failure rates of parts "H" includes the following steps: selecting the name of
13 the object to be tested 730; then displaying the picture 731 so as to indicate
14 the picture of the corresponding part; inputting the rate 732 to indicate the
15 part corresponding to the item and the failure rate of the corresponding part,
16 to facilitate the analysis work of the testing program.

17 Referring to Fig. 1, the item of linking and compiling files "I"
18 includes the following steps: again selecting the name and picture of the
19 object to be tested 740; after confirmation, then making the testing program
20 by the compiling process 741, if not confirmed, returning to the main menu.

21 Accordingly, by means of co-operation of the above-mentioned
22 flow charts, the designer may be guided by the complete scheme to change
23 and operate the testing program by a humanity interface, thereby obtaining
24 the programs that is rapid and convenient with little error and failure. In

1 addition, the designer only needs to change the parameters or values, so that
2 the change and maintenance of the entire program are rapid and exact.

3 Although the invention has been explained in relation to its
4 preferred embodiment as mentioned above, it is to be understood that many
5 other possible modifications and variations can be made without departing
6 from the scope of the present invention. It is, therefore, contemplated that the
7 appended claim or claims will cover such modifications and variations that
8 fall within the true scope of the invention.